

KINGSTON TECHNOLOGY
FAST ETHERX 16-PORT,
24-PORT & 32-PORT
10/100TX RACK-MOUNTABLE
FAST ETHERNET SWITCH
USER'S GUIDE

MODEL(S): KNS1650/R
KNS2450/R
KNS3250/R

Kingston Technology's Fast EtheRx 16-Port, 24-Port, & 32-Port 10/100BASE-TX Rack-Mountable Fast Ethernet Switch

User's Guide

Part No. 4460186-001.A00



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Important Safety Instructions

1. Read all these instructions.
2. Save these instructions for later use.
3. Follow all warnings and instructions marked on the product.
4. Do not use this product near water.
5. This product should be operated from the type of power source indicated on the marking label. If you are not sure of the type of power available, consult your dealer or local power company.
6. Do not attempt to service this product yourself, as opening or removing covers may expose you to dangerous voltage points or other risk. Refer all servicing to service personnel.

Wichtige Sicherheitshinweise

1. Diese Hinweise sollten vollständig durchgelesen werden.
2. Diese Hinweise für einen späteren Gebrauch aufbewahren.
3. Allen auf dem Gerät angebrachten Warnungen und Hinweisen folgen.
4. Das Gerät nicht in der Nähe von Wasser verwenden.
5. Das Gerät nur mit dem Aufkleber bezeichneten Netzspannung betreiben. Bei Fragen über die Art der Netzspannung sollte der Händler oder das Energieversorgungsunternehmen zu rate gezogen werden.
6. Nicht versuchen das Produkt selbst zu reparieren. In allen Produkten existieren gefährliche elektrische Spannungen. Nicht das Gehäuse öffnen.

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Introduction

Intended Audience: This manual assumes that the user has a general working knowledge of networking principles and architecture and is familiar with network systems in general.

Congratulations on the purchase of your new Kingston Fast EtheRx 10/100BASE-TX Rack-Mountable Fast Ethernet Switch. There are three models available, the **KNS1650/R**, the **KNS2450/R** and the **KNS3250/R**, 16-ports, 24-ports and 32-ports, respectively. The Fast EtheRx Switch is a high-performance 10/100BASE-TX switch ideal for the small-to-medium businesses. The Fast EtheRx Switch has sixteen (16), twenty-four (24) or thirty-two (32) UTP ports (depending on model) that auto-negotiate speed detection for 10/100BASE-TX and half-duplex / full-duplex mode operation. The Kingston Fast EtheRx Switch allows standard 10BASE-T Ethernet networks to communicate with 100BASE-TX Fast Ethernet networks and to segment both 10Mbps and 100Mbps networks. The KNS1650/R, KNS2450/R, and KNS3250/R switches also provide additional features such as VLAN, link trunking, broadcast storm control, secure mode traffic filtering and flow control. The Fast EtheRx Switch complies with IEEE802.3u 100BASE-TX, IEEE802.3i 10BASE-T, IEEE 802.3x and IEEE802.3 CSMA/CD Ethernet Standards.

The Fast EtheRx Switch may be used in both standard desktop and 19" rack-mount installations (using the mounting brackets provided with the unit). For easy recognition of network status and troubleshooting, the front panel includes a variety of diagnostic LEDs including Power, 100TX Speed Detection, Link, Receive, Transmit, Collision, and Full-Duplex status.

For the remainder of this manual, the KNS1650/R, KNS2450/R, and KNS3250/R will be referred to collectively as the Fast EtheRx Switch.

Model Types

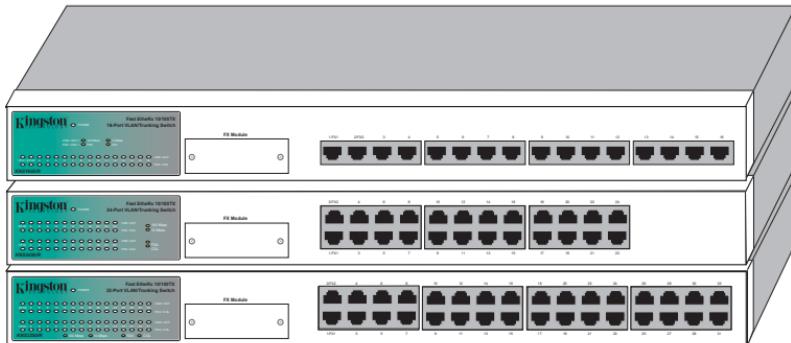


Fig.1 - KNS1650/R, KNS2450/R, & KNS3250/R

Special Features

- Provides automatic switching function between 100BASE-TX and 10BASE-T networks.
- Sixteen (16), twenty-four (24), or thirty-two (32) auto-negotiating ports for 10/100Mbps operation.
- Trunking capabilities,
- Supports 16, 24, or 32 port-based VLANs.
- 16, 24, or 32 UTP ports that auto-negotiate 10/100Mbps operation.
- Auto-negotiates full- or half-duplex operation.
- Store-and-Forward switching approach to minimize re-transmission of faulty packets.
- Filtering/Forwarding rate of 148,800 packets per second at 100Mbps.
- Filtering/Forwarding rate of 14,880 packets per second at 10Mbps.
- 1K active address entry table per device with self-learning and table aging.
- 2 MB packet buffer per eight ports.

Package Contents

Your Fast EtheRx package should contain the following items:

- One of the following model Fast EtheRx switches:
 - KNS1650/R
 - KNS2450/R
 - KNS3250/R
- AC Power Cord
- Kingston Switch Configuration Utility floppy diskette
- Configuration Cable
- Mounting kit including:
 - (2) Angle Brackets
 - (4) Mounting Bracket Screws
 - (4) 10/32" Rack-Mount thumb screws
 - (4) Rubber Feet
- User's Guide

If any of the items are missing or damaged, please contact your Kingston dealer for a replacement. Be sure the items you receive are genuine Kingston Technology products. If the Kingston name and logo are not on the front panel of your unit, it's not a genuine Kingston product.

Design Features

VLAN

VLAN is short for Virtual Local Area Network, and is generally defined as a broadcast domain. It can be viewed as a group of end nodes which can communicate with each other even though they may be located on different physical network segments.

The Fast EtheRx switch provides a simple solution to protect your network against broadcast storming by creating segments based on Layer 2 Ethernet information. As a result, each group of stations connected to a separate segmented port form an isolated Broadcast Domain. In a switched network environment, a broadcast packet or an unknown destination MAC address packet will broadcast to ALL ports, which can decrease the entire network system performance dramatically. By grouping ports into VLANs, broadcast packets will only be sent to the ports within the same VLAN without effecting the traffic of the ports outside of the VLAN. Broadcast sharing ports can be used to connect servers and other common services, such as Internet access, that are used by all the stations connected to the different segmented ports.

Typically users are grouped according to similar characteristics such as a common business function or a common protocol. A single switch may have several independent VLANs within it.

Link Trunking

Link trunking is basically a method of treating multiple physical links as a single logical link. By grouping ports into a trunk, you can increase the available bandwidth between switches or servers. Multiple lower speed links can be grouped into a single higher speed link. For example, four full-duplex 100Mbps link, such as ports 1 through 4, can be grouped as a single 800Mbps link as Trunk 1.

Switching Function

The Fast EtheRx Switch is basically designed to bridge Standard 10BASE-T Ethernet networks to 100BASE-TX Fast Ethernet networks and to segment 10Mbps or 100Mbps network segments.

Auto-Negotiation

Auto-Negotiation provides the means of automatically establishing a link by detecting the link capabilities of the connected device on the network to select the best operational mode available (i.e. 100BASE-TX/10BASE-T selection, half- / full-duplex mode operation, etc.)

Full-Duplex

Full-Duplex transmission means that dedicated inbound and outbound channels are established for bi-directional transmission of data. This allows the collision detection mechanism (CSMA/CD) to be by-passed, thus decreasing transmission delay normally caused by listening, collisions, and packet resends when operating in half-duplex mode.

Store-and-Forward Switching

The Fast EtheRx Switch uses a packet-forwarding method called Store-and-Forward, which minimizes the re-transmission of faulty data packets. This means that the Fast EtheRx Switch can store the incoming frame in an internal buffer and check the packet for errors before sending it out to the destination port. If the frame does contain errors, it will be discarded and then retransmitted.

Flow Control

In half-duplex mode the Fast EtheRx Switch implements a collision-based backpressure flow control mechanism that reduces the risk of data loss at congested ports. This is accomplished by forcing a collision with the data frames on all ports once the free-buffer queue has reached the pre-set minimum.

In full-duplex mode the Fast EtheRx Switch implements the IEEE 802.3x flow control mechanism. This is accomplished by sending a PAUSE packet on a port when the number of buffers allocated to this port exceeds the pre-set minimum.

Hardware Installation

Before you begin installing network cables, please take a few moments to familiarize yourself with Fast EtheRx Switch. The functions on the front and rear panels are illustrated in the following sections.

Front Panel

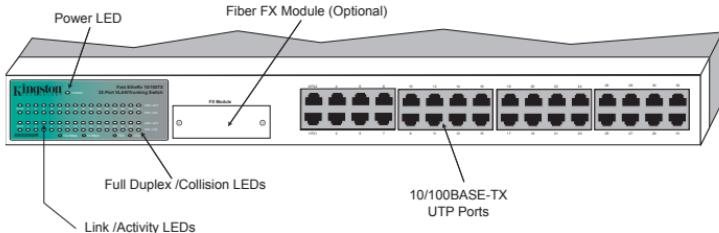


Fig. 2 KNS2450/R Front Panel

Power LED

The PWR LED indicates the power status of the Fast EtheRx Switch. The LED will light up steady green when the AC power cord is connected to the unit from a power source.

Link / Activity LED

The LINK/ACT LED uses a single LED to display two functions. A steady green light indicates that a good link has been established, and a flashing green light indicates when data is being received or transmitted. If the LED does not display solid green indicating a good link, check the following:

1. Make sure that the power is turned on for both the Fast EtheRx Switch and the attached device.
2. Verify that the drivers for the network adapter have been loaded on the PC. Some network adapters require that the driver be loaded before establishing a proper link.
3. Make sure the cable is wired properly and connected on both ends.
4. Make sure the correct cable type has been selected.
5. If steps 1 through 4 are correct, please check the cable, as it may be defective or wired incorrectly. Replace the cable and try again. Please refer to Appendix A for Pin Assignments and Appendix B for Cabling Guidelines.

Full Duplex and Collision LED

The FDX/COLL LED uses a single color LED to display two functions. A solid green light indicates that Full-Duplex operation has been detected. A flashing amber light indicates that a collision has occurred in half-duplex mode. Full-Duplex mode is auto-negotiated on all UTP ports.

Fiber FX module port (optional)

The fiber FX module port can be used with an optional MT-RJ, ST, or SC fiber module. Port 1 & 2 on the switch are associated with this module. If the optional module is used, then port 1 & 2 on the switch can not be used. For more details on the modules and instructions on installing them, please refer to Appendix D - Fiber FX Modules and installation.

10/100TX UTP Ports

The Fast EtheRx Switch has 16, 24, or 32 (depending on model) UTP ports that auto-negotiate both 100BASE-TX and 10BASE-T connections, as well as half- or full-duplex operation.

Rear Panel

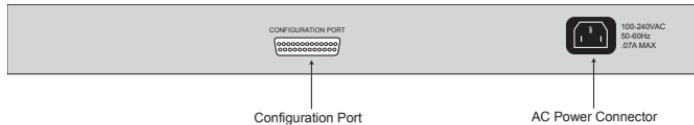


Fig.3 - Rear Panel

AC Power Connector

The Fast EtheRx Switch uses a 100-240VAC internal power supply. Connect the AC power cord from the back of the unit to an AC electrical outlet.

Configuration Port

The Fast EtheRx Switch can be managed using the Kingston Switch Configuration Utility by connecting the configuration cable from the Configuration Port to the parallel port on the back of your host computer.

Software Installation

The Fast EtheRx Switch has several advanced features which can be configured from a **Windows 95, 98, NT or 2000** workstation using the provided configuration cable. The software utility allows for VLAN, link trunking, broadcast storm control, secure mode traffic filtering and flow control configuration. The switch configuration software can only be installed on a **Windows 95, 98, NT or 2000** system. To install the software, follow the directions below:

1. Insert the Switch Configuration Utility diskette into the floppy disk drive.
2. Go to the Start menu and select Run.
3. Type in **A:\SETUP** and click OK.
4. Follow the on-screen prompts to complete the installation process.

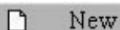
Switch Configuration Utility

Upon launch, the Device Configuration main screen contains will appear as shown below.

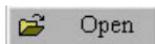
Device Configuration Main Screen



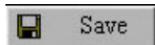
File



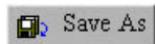
This option brings up the default configuration settings for the currently selected device type.



Use this option to open a previously saved configuration file.



Save the current configuration to a switch configuration file.



Save the current configuration with another file name.

Device Type

Choose the type of device that is connected for configuration. There are six types which can be selected, the 16, 24 and 32 port models, with or without the fiber option.



Use the properties button to begin configuration settings. A window with 5 different configuration tabs will be brought up. After modifying the switch configuration, the settings can be written to the device if desired. Configuration data can also be viewed by selecting this option after selecting Read.

Printer Port I/O Address

This option should be used to select the Input /Output Range associated with the printer port on your computer. To find out what the setting should be follow the procedure below:

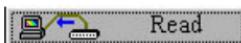
1. Go to Start, Settings and select Control Panel.
2. Double click on the System icon.
3. Go to the Device Manager.
4. Open up the Ports (COM & LPT) heading by click on the plus sign next to the heading.
5. Highlight the Printer Port (LPT1) and click on the Properties button.
6. Go to the Resources tab and the Input/Output Range should be displayed. This is the value which needs to be selected in the Switch Configuration Utility.



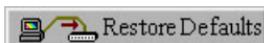
Use this button to save the current configuration data to the device. After a successful write operation, the device automatically resets and initializes the new configuration.

If the write operation fails, check the following:

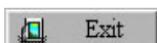
- Verify the configuration cable is well connected.
- Ensure that the configuration cable is connected directly from the PC to the Switch. If any other devices are connected to the PC's printer port, please disconnect them before attempting the configuration of the switch.
- Check the host PC to verify that the drivers for the Printer Port (LPT1) are installed correctly.
- Make sure the I/O address selected in the Printer Port I/O Address field matches the actual setting on the host PC.



Use this button to read the configuration data from the device. If the operation is successful, the current configuration will become `_Inside_Device_Configuration`.

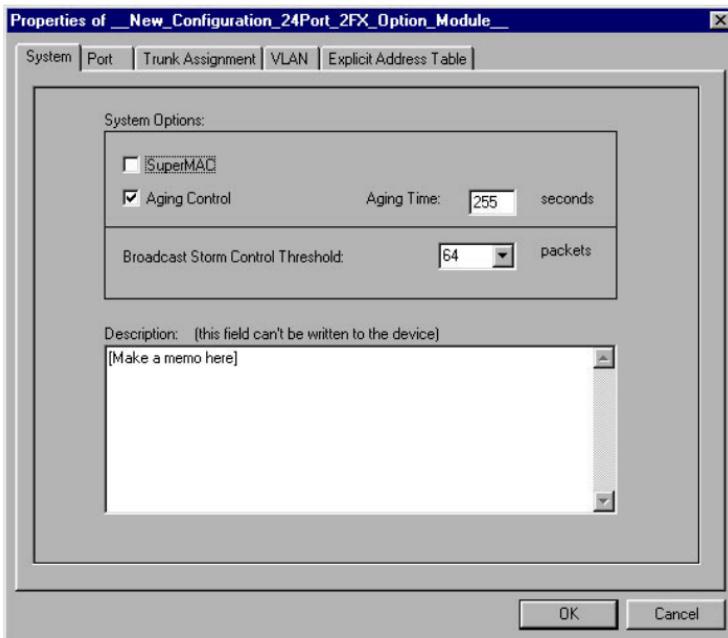


This button will write the factory default settings to the switch.



Use this button to quit the Switch Configuration Utility.

Device Configuration Properties



System

Parameters adjusted in this window will control overall system performance.

SuperMAC

- **Enable:** When a collision occurs, the port on which the collision occurs will perform a more aggressive back off algorithm of up to 3 slots.
- **Disable:** This is the default setting, when a collision occurs, the device will perform the IEEE802.3 standard exponential backoff algorithm.

Aging Control

- **Enable:** By default this option is enabled and set with an aging time of 255 seconds. When enabled, learned MAC addresses are discarded after the aging time has been reached. The aging time can be set between 1 and 510 seconds.
- **Disable:** The Fast EtheRx Switch will retain the learned source MAC addresses for each port.

Only dynamically learned addresses will be aged. No explicit (static) entries will be aged out.

Aging Time

The address-aging timer is built in to the table aging process. The minimum time is 1 second and the maximum is 510 seconds. 255 is the default value, if the number exceeds 255 it must be an even number.

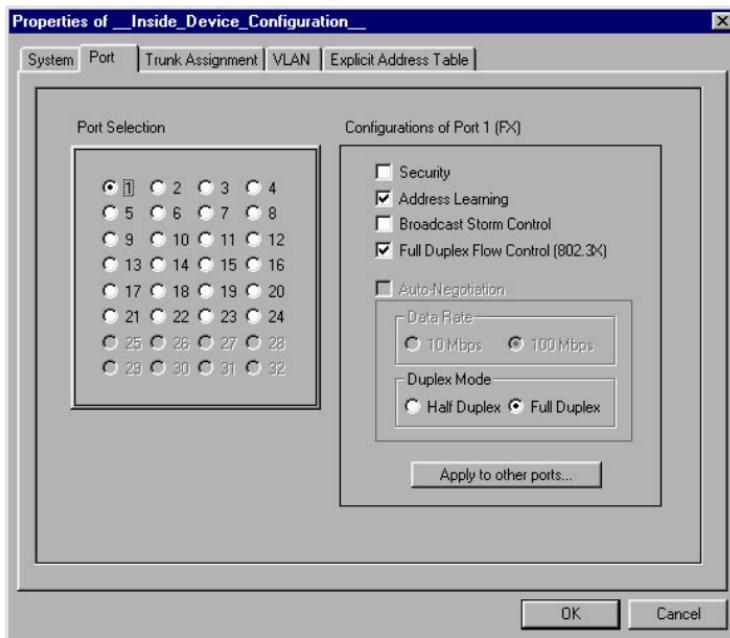
Broadcast Storm Control Threshold

The Broadcast storm control function limits the number of consecutive broadcast packets for each port that has Broadcast Storm Control enabled. The broadcast packets are stored in the buffer and sent to the other ports one by one. In the buffer, when the number of stored broadcast packets exceeds the specified threshold, the device will discard the consecutive incoming broadcast packets until the number of stored broadcast packets is below the threshold. The assignable values are 16, 32, 48 and 64 with 64 being the default.

Description

This is basically a comment section for notes by the user. Up to 2048 characters can be written. This description can only be saved and read from the disk file, the information is not stored on the device itself.

Port



Individual port parameters are configured from this window. Select the port from the window on the left hand side and then modify the parameters on the right. Use the Apply to Other Ports button to assign the same setting to other ports.

Port Selection

Designates the port to be configured.

Security

- **Enable:** Packets which result in security violations at the designated port will be discarded. Security violations would happen if a packet is received from an unknown source MAC address or a source MAC address learned previously from another port. Once enabled, the device will disable address learning and the aging process for this port. Users should add the MAC address of the workstation connected to this port to the address table if they do not want the packets to be discarded.
- **Disable:** The forwarding decision made about packets received from the port will not involve source MAC address checking. This is the default option.

Address Learning

- **Enable:** This option is enabled by default, which will cause the MAC address of the source of a packet to be learned.
- **Disable:** When disabled, the MAC address of the source of a packet from this port will not be learned.

Broadcast Storm Control

- **Enable:** If the accumulated consecutive broadcast packets in the input buffer of a port is over the threshold specified by the value of the Broadcast Storm Control Threshold on the System Page, new incoming broadcast packets will be discarded until the number has been reduced below the threshold.
- **Disable:** Disabled by default, this option ensures the broadcast packet will not be throttled.

Full Duplex Flow Control

- **Enable:** Enabled by default, this option allows the 802.3x full duplex flow control mechanism.
- **Disable:** When disabled, the 802.3x flow control mechanism is not used in full duplex mode.

Auto-Negotiation

- **Enable:** Enabled by default, this option allows the port to determine the Data Rate and Duplex Mode of the attached device.
- **Disable:** Disabling this option allows the user to specify the Data Rate and Duplex Mode settings manually.

Note: If using the port with the fiber (FX) interface, this option is disabled.

Data Rate

The user may specify the data transmission rate for the selected port.

Note: If using the port with the fiber (FX) interface, this option is fixed at 100Mbps.

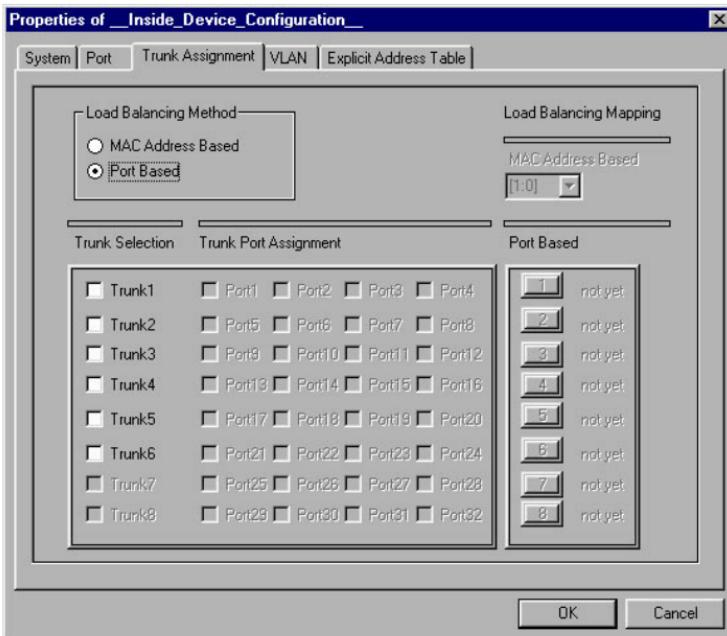
Duplex Mode

The user may specify full duplex or half duplex mode for this port.

Apply to Other Ports

When the Apply to Other Ports button is selected, a popup window will appear allowing you to select any other ports that you wish to have the same configuration as the currently selected port.

Trunk Assignment



The Kingston KNS1650R, KNS2450R, and KNS3250R switches support link aggregation/trunking. Trunking is a method of grouping multiple physical links as a single logical link. The benefit is to be able to group multiple lower speed links into one high speed link for bandwidth aggregation. For instance, four full duplex 100Mbps links, such as port 1-4, could be grouped into one 800Mbps link for Trunk 1. Trunking is most commonly used between the switch and server or between two switches.

See the chart below for the maximum number of trunks per switch:

Switch Model	Number of Trunks
KNS1650/R 16 Port Switch	Up to 4 Trunks
KNS2450/R 24 Port Switch	Up to 6 Trunks
KNS3250/R 32 Port Switch	Up to 8 Trunks

Each port based trunk can have between 2-4 trunk ports as members of the trunk. MAC Address based trunks must have 4 trunk ports per trunk.

Load Balancing Method

In a multiple link trunk, the links within a trunk should have an equal amount of traffic in order to achieve maximum efficiency. Thus, some sort of load balancing amongst the links of a trunk must be deployed. The Kingston KNS1650/R, 2450/R, and 3250/R switches support MAC address based and port based balancing methods. Using these methods, any packet with a trunk destination received by the switch can be forwarded to a proper trunk port. After choosing one method, the user must specify the relative load-balancing mapping to complete the configuration of the trunk port load balancing.

Trunk Selection, Trunk Port Assignment

Place checkmarks in the boxes of the desired trunk and check the desired trunk port assignments per trunk.

Trunk: A Trunk is a group of Trunk Ports grouped together.

Port Based Trunk: Each Port Based Trunk may have 2, 3, or 4 Trunk Ports.

MAC Address Based Trunk: Each MAC Address Based Trunk must contain 4 Ports.

Trunk Ports: A port assigned to a Trunk. The Trunk Ports are setup in groups of 4 and must be selected based on the groups. For example, Trunk 1 can only contain Trunk Ports 1, 2, 3, or 4.

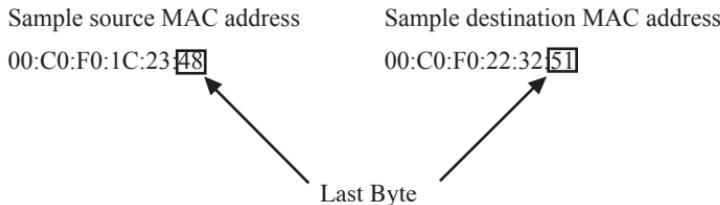
Load Balancing Mapping - MAC Address Based

When the switch receives a packet with a trunk destination, it will automatically forward the packet to a trunk port based on the source MAC address (SA) and destination MAC address (DA) of the packet. The device uses two bits from SA and DA to map to four trunk ports.

The user can select which two bits should be used for mapping:

- [1:0] Uses bit 1 and 0 for mapping.
- [3:2] Uses bit 3 and 2 for mapping.
- [5:4] Uses bit 5 and 4 for mapping.
- [7:6] Uses bit 7 and 6 for mapping.

Each MAC Address contains 6 bytes of data, the last byte is taken from the source MAC address (SA) and the last byte from the destination MAC address (DA). Each byte contains 8 bits of data and the user can determine which two bits of the last byte are used to map the trunk port. See the example on the following page:



The byte is in hexadecimal format, the chart below shows the binary value and the bit numbers:

		Byte = Bit Data
Bit Number:		7 6 5 4 3 2 1 0
Last byte of source MAC address (SA)	48	0 1 0 0 1 0 0 0
Last byte of destination MAC address (DA)	51	0 1 0 1 0 0 0 1

The mapping rule is described below:

1. The two bits selected by the user for mapping will result in an odd or even value assignment.

Exclusive Or (XOR) Values

Bit 1	Bit 2	Bits Selected	Value
0	0	0 XOR 0	= 0 [Even]
0	1	0 XOR 1	= 1 [Odd]
1	0	1 XOR 0	= 1 [Odd]
1	1	1 XOR 1	= 0 [Even]

2. Four combinations of the result are mapped to four trunk ports:

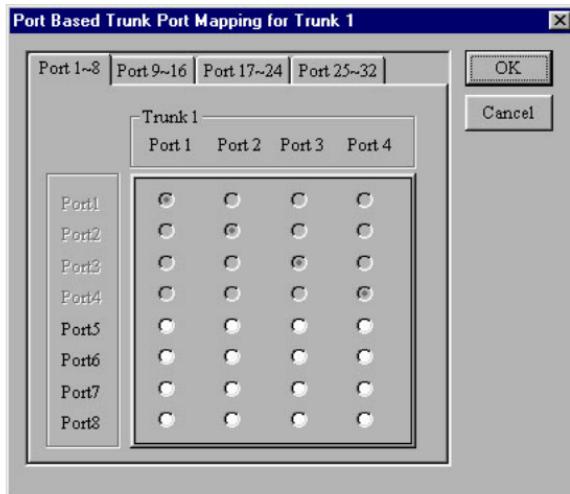
Source Address	Destination Address	Trunk Port
Odd	Odd	Trunk Port 1
Odd	Even	Trunk Port 2
Even	Odd	Trunk Port 3
Even	Even	Trunk Port 4

For example, if the user specifies bit 1 and 0 for mapping and Trunk 2 is assigned, the packets would be sent to the third Trunk Port of Trunk 2 (which would be Port 7).

Load Balancing Mapping – Port Based

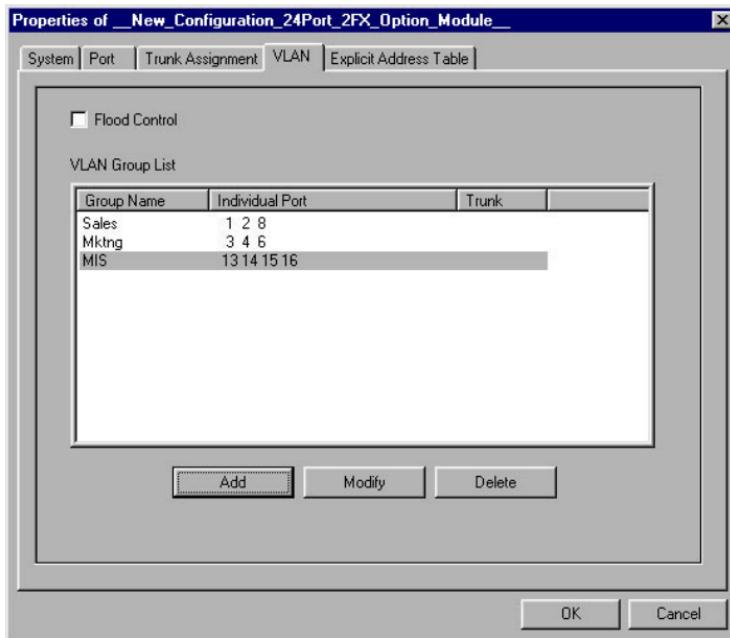
The port-based load balancing method is an explicit port assignment scheme. It requires that all other ports are assigned to a specific link (trunk port) in the trunk. When the switch receives a packet with a trunk destination, it will automatically forward the packet to a trunk port based on the port it came from.

First select a trunk, then click its Port Based button on the right hand side of the screen under Load Balancing Mapping. The Port Based Trunk Port Mapping for Trunk x window will appear as shown below.



Click the radio buttons to map each port to one of the trunk ports. All assignments must be completed before it will allow you to close the window. After that, the status will display 'ok' on the right side of the Port Based button. If the status 'not yet' is displayed, then the load-balancing mapping has not been completed.

VLAN



This window allows users to define VLAN membership by groups of device ports. Any individual port or trunk can be a member of a VLAN group. A VLAN group is basically a broadcast domain, but any port/trunk is not limited to belonging to only one VLAN group. The forwarding rule is that packets from the source port/trunk will only be forwarded to a destination port/trunk within the same VLAN group. That is, a broadcast/multicast packet will be forwarded to all ports/trunks within the same VLAN group(s) of the source port/trunk except the source port/trunk itself. Unicast packets will be forwarded to the destination port/trunk only if the destination port/trunk is in the same VLAN group as the source port/trunk.

Flood Control

Within a VLAN, the flood control function is provided to decide what to do with incoming unicast packets with unknown destination MAC addresses.

Enable: Packets received with an unknown unicast destination address (DA) will be forwarded to the specified out-link in the same VLAN group. But if the source port (trunk) belongs to more than one VLAN group, then the packet will only be forwarded to one of the out-links.

Disable: This option is selected by default. Packets received with an unknown unicast destination address (DA) will be forwarded to all ports (except the receiving port) within the same VLAN groups that the received port (trunk) belongs to.

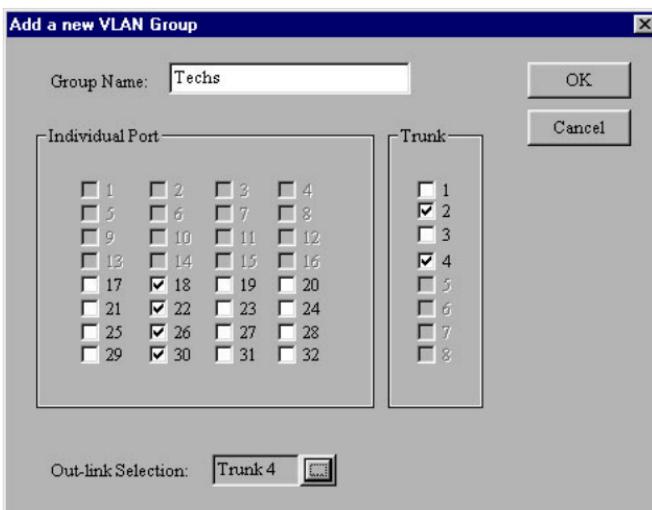
Flood control is available only when at least one VLAN group is assigned. And the out-link port must be assigned when flood control is enabled for proper operation.

When flood control is enabled, each VLAN group must choose a member as its out-link. If some VLAN groups have overlapped members, one of these members should be chosen as the out-link. If a port (or trunk) belongs to more than one VLAN group, packets that it receives with an unknown destination address (DA) will only be forwarded to one of the out-links of those VLAN groups that it belongs to.

VLAN Group

The list box shows all defined VLAN groups of the system, and each row is a group. Any individual port or trunk can be a member of a VLAN group, and each group comprises at least two members. One of the members is to be chosen as its out-link. If flood control is disabled, the Out-link column will not appear.

To remove the current highlighted group, press the Delete button. Press the Add button to add a new group. To modify settings, select the Modify button or double click the current highlighted group to modify its content. While adding or modifying a VLAN group, the dialog *Modify the VLAN Group* (or *Add a New VLAN Group*) as below will popup for user to specify its content.



The group count is not limited. Users can specify n VLAN groups or even more groups for any n (n=number of ports on your switch) port switch. But note that after writing to the device, only the information of the first n/2 added VLAN groups can be read back from the device of n port switch.

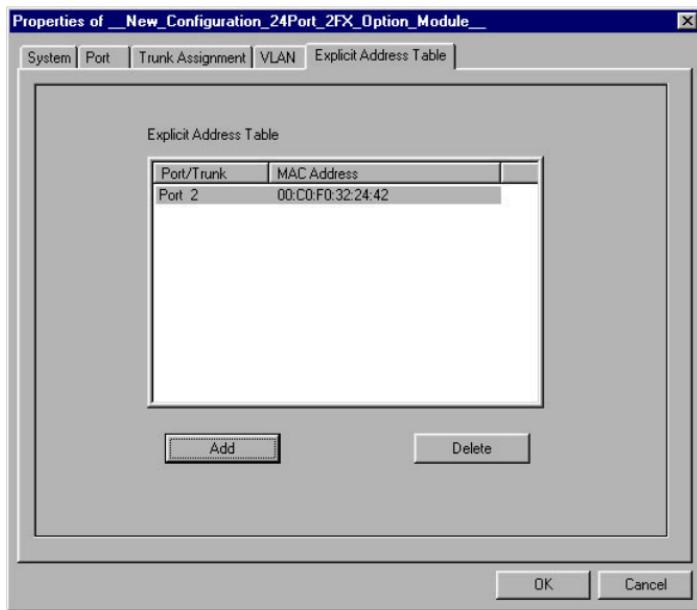
Note: Once at least one VLAN group has been added, the system will automatically gather all un-selected members as an implicit VLAN group. Users are recommended to explicitly assign all groups they need, although they know that there exists an implicit VLAN group.

Group Name: Create a group name up to 8 characters long.

Individual Port / Trunk: Both individual ports and trunks can be the members of a VLAN group. All light checkboxes are qualified members of a VLAN. At least two members must be selected to create a VLAN group.

Out-link Selection: If flood control is enabled, one port or trunk should be chosen as the out-link of this VLAN group. Click on the button to the right of 'Out-Link Selection' to bring up the popup window.

Explicit Address Table Page



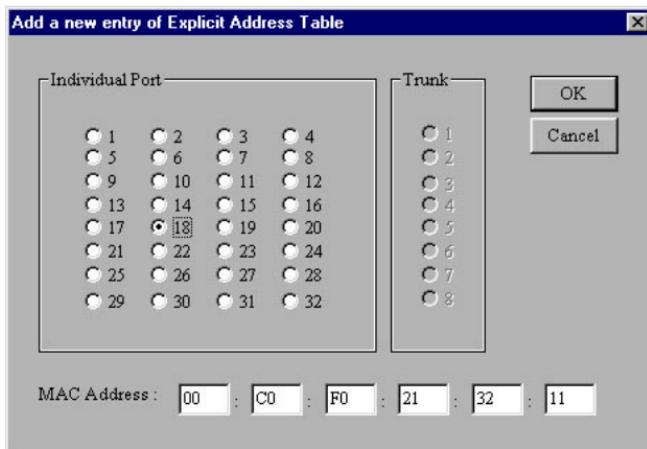
The address table of the switch uses address learning (dynamic) or manual entry (static). Static entries are added to the address table of the device in this window. Static address entries are not aged or updated by the switch's address learning.

Explicit Address Table

The list box displays all explicit (static) entries for the address table. Each row is an entry for a MAC address to an individual port or a trunk. There are a total of 10 static addresses that can be assigned to Port 1 – 8, Port 9-16, Port 17 – 24, and Port 25 – 32 group, respectively.

Pressing the Delete button will remove the entry which is currently highlighted, or press the Add button to add a new entry.

Note: Normally, the device has a static entry capacity of 10 per each group. Each group consists of 8 consecutive ports and 2 trunks, that is, Port 1-8 and Trunk 1-2 belong to a group, Port 9-16 and Trunk 3-4 belong to another group, ...etc. However, if a static address is assigned for Trunk 3-8, it will occupy an entry for all groups, not just the group it belongs to. That is, if there is any static address assigned for Trunk 3-8, it will reduce the entry capacity of each group. In the Add a new entry of Explicit Address Table window, ports and trunks are grayed out when there is no capacity to place a static entry for them.

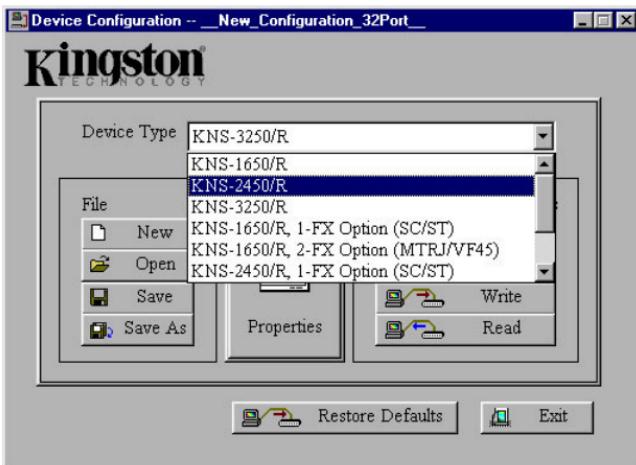


In this window, input the MAC address of a workstation, and choose an individual port or a trunk to which the workstation is connected.

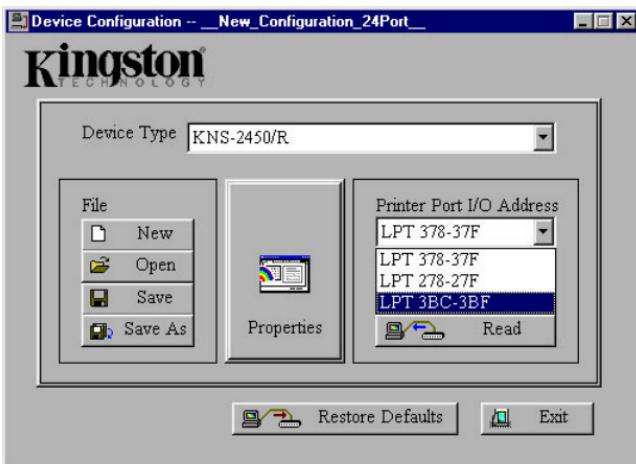
Using the Switch Configuration Utility

Editing a Configuration File

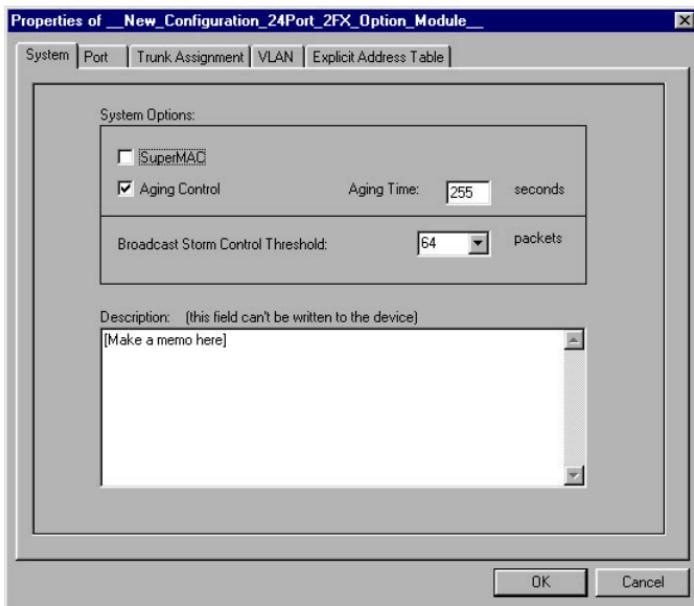
1. Go to the Start menu, highlight Programs, Kingston Switch Configuration, and click on the Switch Configuration item.
2. In the main window, choose the switch model from the Device Type pulldown menu.



3. Select the I/O address used by the printer port of the host computer attached to the switch from the Printer Port I/O Address pulldown menu.



4. Click the button Open to open an existing configuration file, if necessary.
5. Click the button Properties to invoke the Properties Window to start or modify configuration settings.
6. Click OK to leave this window, if finished these settings.

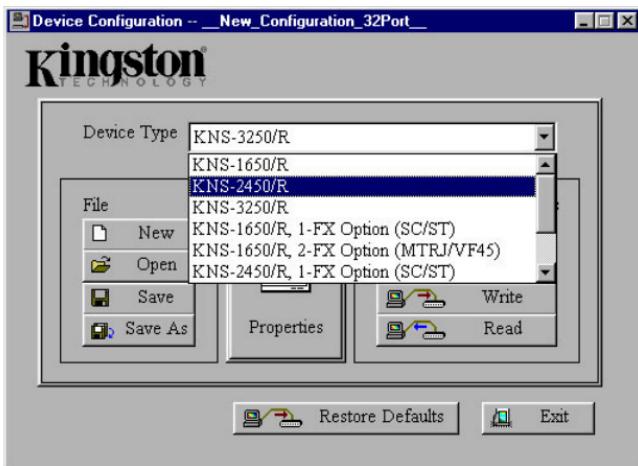


7. Click the button Save or Save As to save current settings as a configuration disk file.

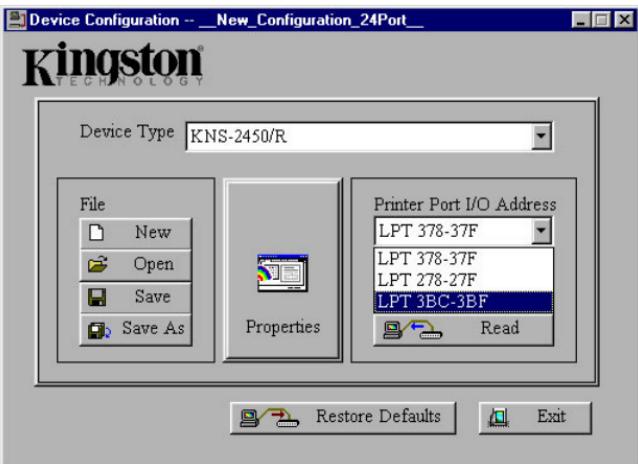
Sending the Current Configuration to the Switch

1. Connect the Configuration Cable directly to the printer port of your host PC and to the Configuration Port on the switch.
2. Power on the switch.
3. Go to the Start menu, highlight Programs, Kingston Switch Configuration, and click on the Switch Configuration item.

4. In the main window, choose the switch model from the Device Type pulldown menu.



5. Select the I/O address used by the printer port of the host computer attached to the switch from the Printer Port I/O Address pulldown menu.



6. Click the Open button to open an existing configuration file if necessary.

7. Click the Write button to write the current configuration data to the switch via the configuration cable.

8. If the data is written successfully, the switch will be auto reset immediately and the current configuration will be initialized.

Assigning Trunks and Setting VLAN Groups

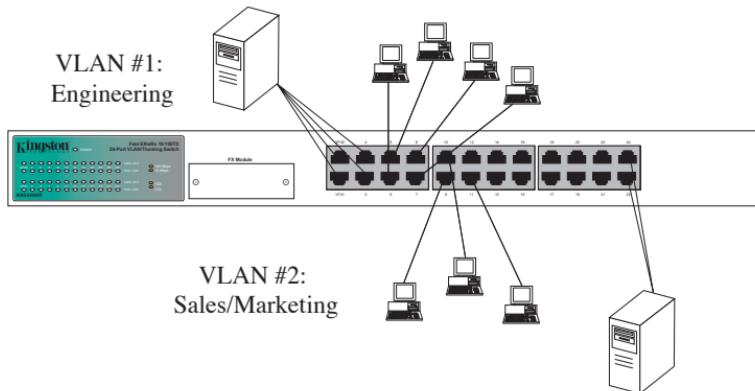
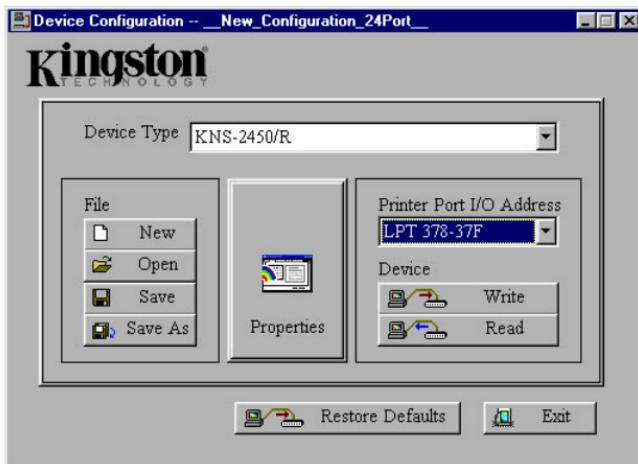


Fig. 4 - VLAN example

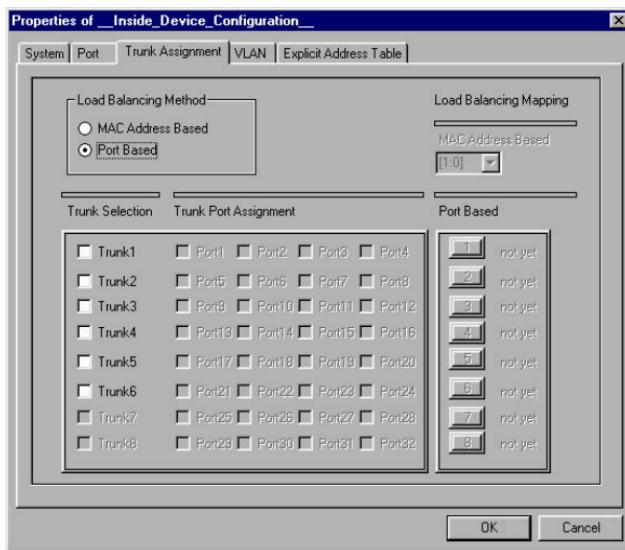
Here we give an example to show how to assign trunks and set VLAN groups. From the figure above, the user plans to configure a 24 port switch into two VLAN groups, one for Engineering and the other for Sales/Marketing. There are four stations connected to Port 5 to Port 8 respectively used by engineers, and a server shared by them which is connected to Trunk 1 by using four trunk ports. On the other side, there are three stations connected to Port 9 to Port 11 respectively used by Sales/Marketing department, and a server shared by them which is connected to Trunk 6 by using two trunk ports.

To achieve the goal above, just follow steps below:

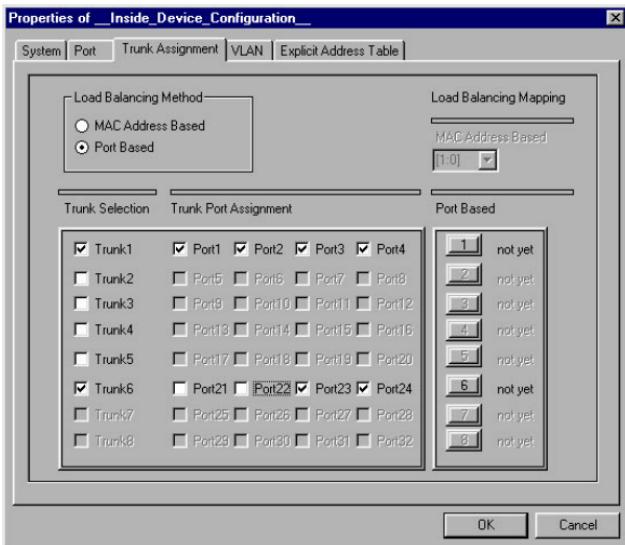
1. Click the Properties button to open the Properties window.



2. Select the Trunk Assignment tab to begin assigning trunks.



3. Click the checkboxes to select Trunk 1 and Trunk 6, and assign their trunk ports. Click the relative Port Based buttons 1 and 6 to begin port-based trunk port mapping.



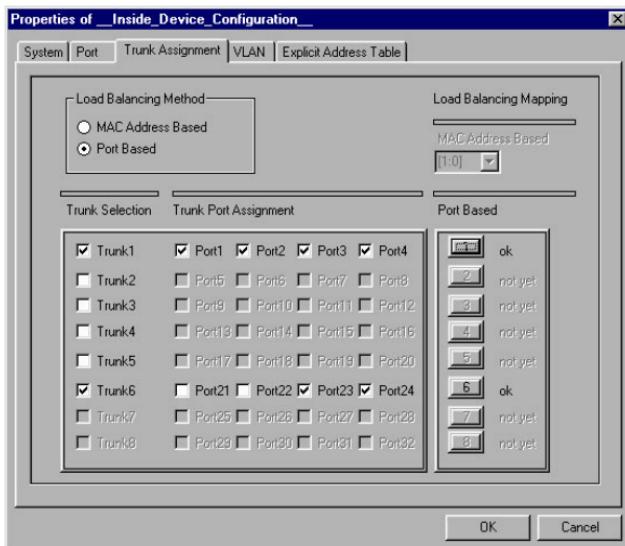
4. Click the radio boxes to assign trunk port mappings for Trunk 1. For Ports 5 to 24, map them to different trunk ports.



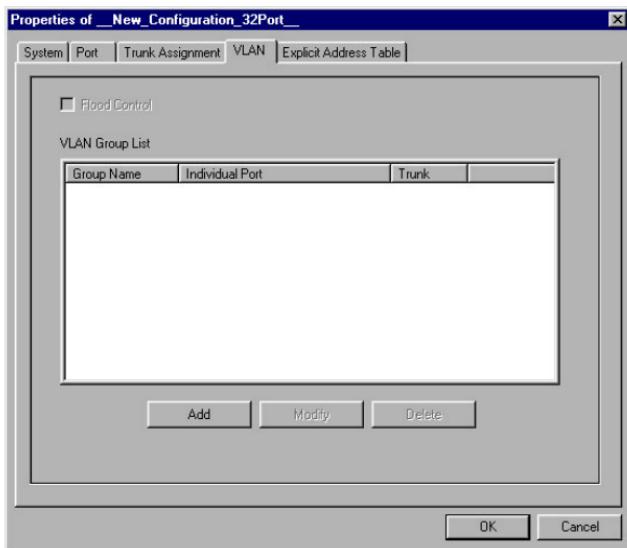
5. Click the radio boxes to assign trunk port mappings for Trunk 6. From Ports 1 to 22, map them to both trunk ports evenly.



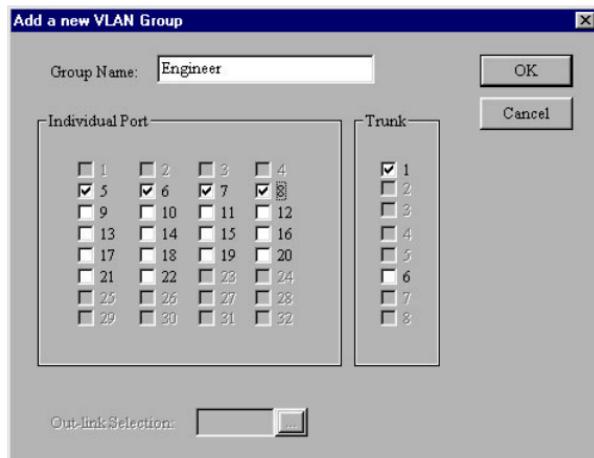
6. After completing the trunk port mappings, OK should appear beside the relative Port Based buttons. Now, all trunk assignments are finished. Click the VLAN page to start VLAN settings.



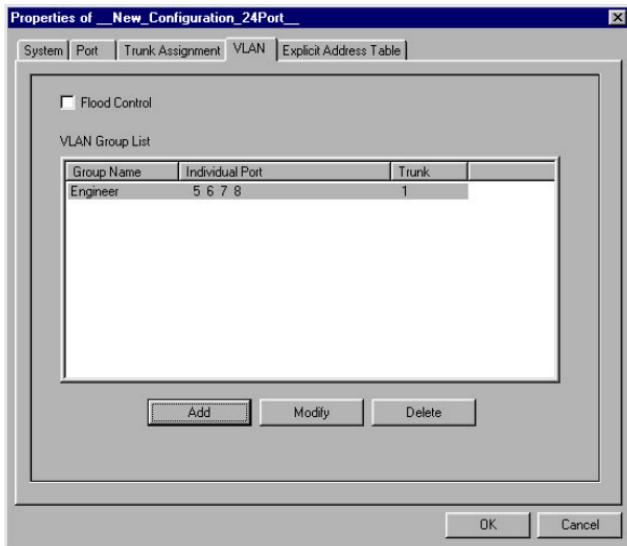
7. Press the Add button to add a VLAN group.



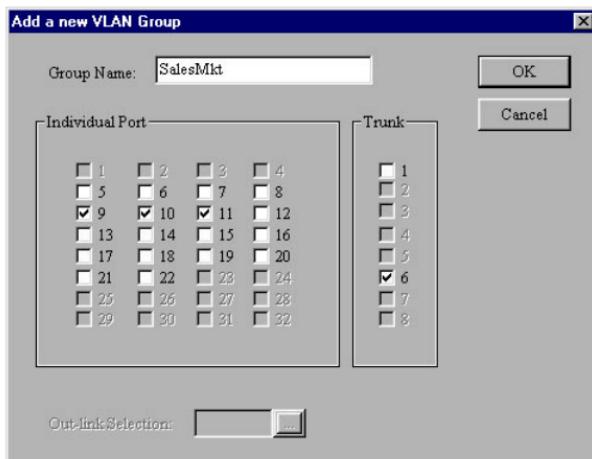
8. Give the name 'Engineer' in the edit box and select Trunk 1 and Ports 5 through 8 to be members of this group.



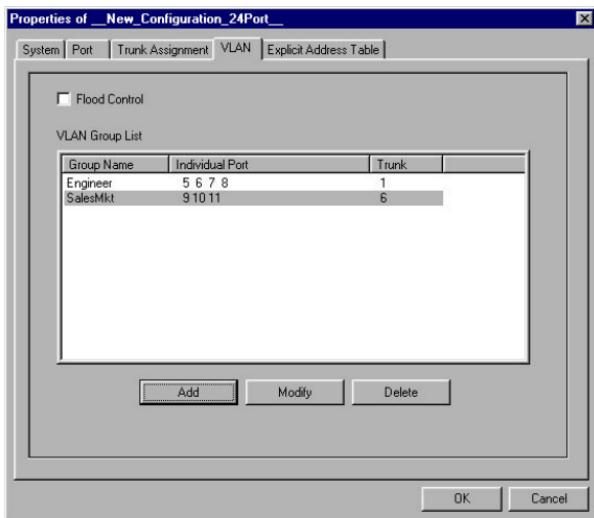
9. Press Add button to add another VLAN group.



10. Type in 'SalesMkt' in the edit box and select Trunk 6, click Ports 9 through 11 to be members of this group.



11. Two VLAN groups have been created, click OK to leave the Properties Window.



12. To retain the settings after powering off the unit, click the Save button to save current configuration as a file, and press the Write button to save the settings to the device itself.

Troubleshooting

Data cannot be read from or written to the device.

1. Make sure the switch is powered on.
2. Make sure the Configuration Cable is well connected. It should be connected to the PC's printer port directly. If there is any device, such as key-pro or printer buffer attached on the printer port, please remove it before connecting the Configuration Cable.
3. On the host PC verify that the drivers for Printer Port (LPT) are installed correctly. Go to the Start menu, highlight settings, and select Control Panel. Double click the system icon and go to the Device Manager tab. Make sure Printer Port exists under the submenu Ports (Com & LPT). If it does not exist, the LPT drivers need to be installed. If it exists, check the properties. Go to the Resource tab and check to make sure the Input/Output Range is 0378-037F, 0278-027F, or 03BC-03BF
4. Check the Parallel Port Mode in the host PC's BIOS settings, if it is SPP, please change it into EPP or ECP mode.
5. Make sure the correct Printer Port I/O Address is selected in the Switch Configuration Utility's main menu.
6. Verify that the correct Device Type is selected in the Switch Configuration Utility.

Appendices

Appendix A Pin Assignments

UTP Port Pin Assignments

UTP Ports use RJ-45 Unshielded Twisted Pair (UTP) cabling. RJ-45 modular plugs and their pin numbers and wiring assignments are listed below. Twisted-Pair cables can be wired with either Straight-Through or Crossover pin assignments. Both wiring schemes are mentioned in “Appendix B Cabling Guidelines” for reference in creating a twisted-pair cable.

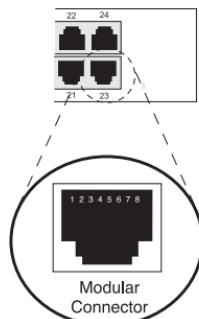


Fig. A-1 RJ-45 Connector Pin Numbers

Pin Number	Function
1	Receive Data +
2	Receive Data -
3	Transmit Data +
4,5	Not Used
6	Transmit Data -
7,8	Not Used

Table A-1 UTP Pin Assignments

Appendix B Cabling Guidelines

UTP Cable Type

When installing network cables, the following table shows appropriate cabling guidelines for 100BASE-TX Fast Ethernet architecture.

Cabling Components	100BASE-TX
Trunk and Patch Cable Type:	4-Pair 100Ω UTP CAT 5 (only 2 pairs used)
Modular Plug:	8-Pin RJ-45 CAT 5 only
Patch Panel:	8-Pin RJ-45 CAT 5 only

Table B-1 Network Cable Guidelines

(NOTE: All UTP cables come in both solid and stranded filament. Solid filament cables are more rigid and usually intended for trunk cabling. Stranded filament cables are more pliable and generally targeted for patch cables. For proper termination, use the correct RJ-45 connector, as they differ for each type of cable.)

UTP Cable Wiring

UTP cables are wired based on one of two standard pin configurations: **Straight-Through** and **Cross-Over**. 100BASE-TX uses only Category-5 UTP cables with four pairs of wire as illustrated below in Tables B-2 and B-3.

Straight-Through Configuration

Pin Number	Pin Number
1 (TRX+)	1 (TRX+)
2 (TRX-)	2 (TRX-)
3 (RCV+)	3 (RCV+)
6 (RCV-)	6 (RCV-)
4, 5, 7, 8	Not Used

Table B-2 Straight-Through Wiring

Cross-Over Configuration

Pin Number	Pin Number
1 (TRX+)	3 (RCV+)
2 (TRX-)	6 (RCV-)
3 (RCV+)	1 (TRX+)
6 (RCV-)	2 (TRX-)
4, 5, 7, 8	Not Used

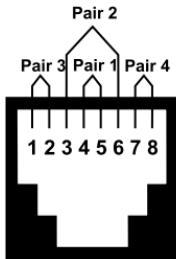
Table B-3 Cross-Over Wiring

UTP Cable Wiring Standards

There are two governmental agencies: the Electronic Industry Association (EIA) and the Telecommunications Industry Association (TIA), which set the standard for all cable wiring requirements for commercial buildings.

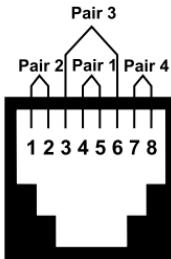
With the advent of 100Mb/s networking products, it is best to use higher quality CAT 5 cables like Belden or Helix as well as CAT 5-compliant patch panels, patch cables, and connectors while following the EIA/TIA wiring standards. 100 W UTP CAT 5 type cables use 4-pair UTP wiring.

Refer to the illustrations below for 4-pair wiring using either T568A (Fig. B-1) or T568B (Fig. B-2) wiring standards. Both T568A and T568B wiring is compatible with 10BASE-T and 100BASE-TX and require no special configurations, but for premise wiring, stick to one wiring standard. Mixing T568A and T568B wiring schemes may cause or lead to potential problems.



T568A

Fig. B-1 4-Pair T568A Wiring



T568B

Fig. B-2 4-Pair T568B Wiring

T568A	Pairs	Strand	Solid
Pin 1	Pair 3	Blue	White/Green
Pin 2	Pair 3	Orange	Green/White
Pin 3	Pair 2	Black	White/Orange
Pin 4	Pair 1	Red	Blue/White
Pin 5	Pair 1	Green	White/Blue
Pin 6	Pair 2	Yellow	Orange/White
Pin 7	Pair 4	Brown	White/Brown
Pin 8	Pair 4	White	Brown/White

Table B-4 4-Pair T568A Wiring

T568B	Pairs	Strand	Solid
Pin 1	Pair 2	Black	White/Orange
Pin 2	Pair 2	Yellow	Orange/White
Pin 3	Pair 3	Blue	White/Green
Pin 4	Pair 1	Red	Blue/White
Pin 5	Pair 1	Green	White/Blue
Pin 6	Pair 3	Orange	Green/White
Pin 7	Pair 4	Brown	White/Brown
Pin 8	Pair 4	White	Brown/White

Table B-5 4-Pair T568B Wiring

UTP Cable Rating Codes

UTP cables meet different UL-NEC requirements based on cable-jacket quality. Below is an explanation of the rating codes for each cable type.

UL – The National Electrical Code (NEC), published by the National Fire Protection Association (NFPA), details advisory safety considerations for electrical wiring. NEC Article 800 Communications Cables are manufactured to meet these different cable types.

1. **CMP** – Cables meeting type CMP requirements are suitable for installation in ducts and plenums without the use of conduit. These cables are designed for fire resistance and low-smoke producing characteristics.
2. **CMR** – Riser type cables are engineered to prevent the spread of fire from floor to floor and are suitable for vertical shaft applications.
3. **CM** – Cables for general building wiring. CM cables are used in areas other than plenums and risers. These cables are resistant to the spread of fire and pass the UL 1581 Vertical Tray Flame Test.
4. **MP, MPR & MPP** – Within Article 800, the Multi-purpose Cables Category allows conditional substitutions between different cable types & are restricted by number, AWG size and stranding of the cable conductors.

Terms You Should Be Familiar With

1. **BACKBONE WIRING** – The physical/electrical interconnections between telecommunications closets and equipment rooms.
2. **COMPLIANCE** – A wiring device that meets all characteristics of a standard is said to be in compliance with that standard.
3. **PREMISE WIRING** – The entire wiring system on the premises especially the supporting wiring that connects the communications outlets to the network interface jack.
4. **NEAR-END CROSSTALK (NEXT)** – In wires packed together within a cable, the signals generated at one end of the link can flush out the weaker signals coming back from the recipient.

Appendix C - Specifications

Compliance:	IEEE 802.3i 10BASE-T Standard IEEE 802.3u 100BASE-TX Standard IEEE 802.3 CSMA/CD Ethernet Standard
Media Interface:	
KNS1650/R	16 auto negotiating 10/100 Mbps UTP ports
KNS2450/R	24 auto negotiating 10/100 Mbps UTP ports
KNS3250/R	32 auto negotiating 10/100 Mbps UTP ports
10BASE-T / 100BASE-TX:	Auto-Negotiation
Half / Full-duplex mode:	Auto-Negotiation
Diagnostic LEDs:	1 LED for Power indicator (steady green)
KNS1650/R	16 LEDs for Link/Activity detection Link = steady green 100 Mbps activity = flashing green 10 Mbps activity = flashing amber
	16 LEDs for Full Duplex/Collision detection Full Duplex = steady green Collision = flashing amber
KNS2450/R	24 LEDs for Link/Activity detection Link = steady green 100 Mbps activity = flashing green 10 Mbps activity = flashing amber
	24 LEDs for Full Duplex/Collision detection Full Duplex = steady green Collision = flashing amber
KNS3250/R	32 LEDs for Link/Activity detection Link = steady green 100 Mbps activity = flashing green 10 Mbps activity = flashing amber
	32 LEDs for Full Duplex/Collision detection Full Duplex = steady green Collision = flashing amber
Switching Approach:	Store-and-Forward
Flow Control:	Half-duplex – Collision-based Backpressure Full-duplex – IEEE 802.3x
MAC Address Support:	1K MAC addresses
Filtering/Forwarding Rate (min. packet size):	
100BASE-TX	148,800 packets/second
10BASE-T	14,880 packets/second
Latency (min. packet size):	
KNS1650/R	100 Mbps to 100 Mbps \leq 11.6 ms 10 Mbps to 10 Mbps \leq 70.5 ms

KNS2450/R	100BASE-TX 10BASE-T	100 Mbps to 100 Mbps \leq 13.6 ms 10 Mbps to 10 Mbps \leq 76.6 ms
KNS3250/R	100BASE-TX 10BASE-T	100 Mbps to 100 Mbps \leq 17.8 ms 10 Mbps to 10 Mbps \leq 76.9 ms
Max. Segment Length:		100 meters (328 feet)
Connector Type:		Female RJ45
Cable Type:		UTP 26 to 22 AWG
Cable Grade:	100BASE-TX 10BASE-T	CAT 5 or better CAT 3, 4, 5 or better
Optional Fiber Support:	MTRJ Interface ST Interface SC Interface	2-port FX module 1-port FX module 1-port FX module
Parallel Configuration Port:		Supports VLAN & Trunking switch configurations

Environmental:

Operating Temperature:	0°C to 45°C (32°F to 113°F)
Storage Temperature:	-20°C to 60°C (-4°F to 140°F)
Relative Humidity:	10% to 90% non-condensing

Electrical:

Input AC Voltage:	100VAC to 240VAC, 50/60 Hz, Auto-sensing
Output DC Voltage:	3.3VDC/6A and 5.0VDC/0.5A

Power Consumption:

KNS1650/R	14 Watts max.
KNS2450/R	16 Watts max.
KNS3250/R	18 Watts max.

Physical:

Dimension (HxWxD):	1.69" x 17.32" x 7.88" (43.3 mm x 443.4 mm x 201.7 mm)
--------------------	---

Weight:

KNS1650/R	5.5 lbs. (2.5 kg)
KNS2450/R	5.8 lbs. (2.6 kg)
KNS3250/R	6.0 lbs. (2.7 kg)

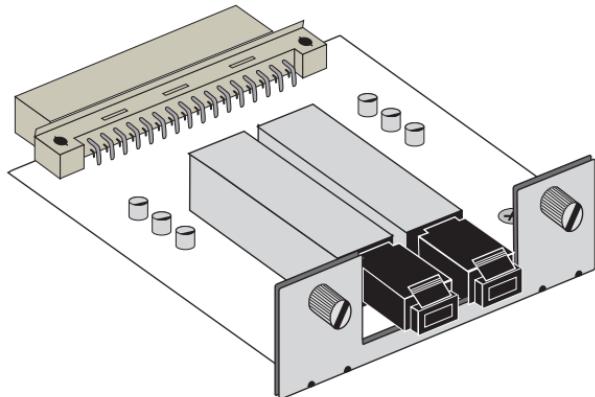
Certification:

EMI Standards:	FCC Class A, CE CISPR A, C-Tick
EMC Standards:	EN55022, IEC801-2, IEC801-3, IEC801-4
Low Voltage Directive:	EN60950
Safety Standards:	UL, cUL, TUV

Appendix D Fiber FX Modules & Installation

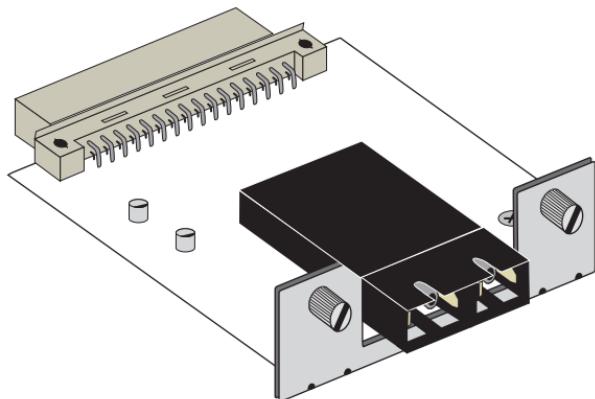
There are three different optional fiber modules available for use with your Fast EtheRx Switch.

KNS150FX/MTRJ



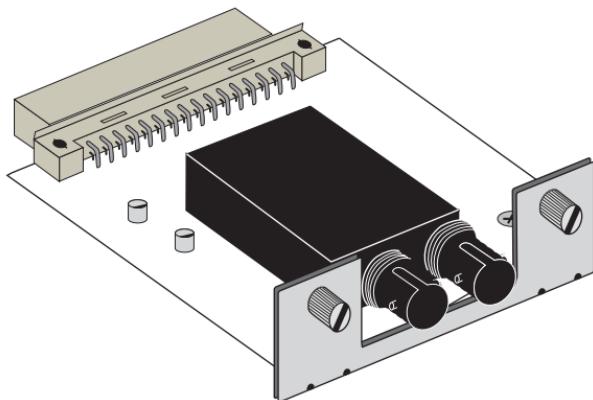
The KNS150FX/MTRJ module

KNS150FX/SC



The KNS150FX/SC module

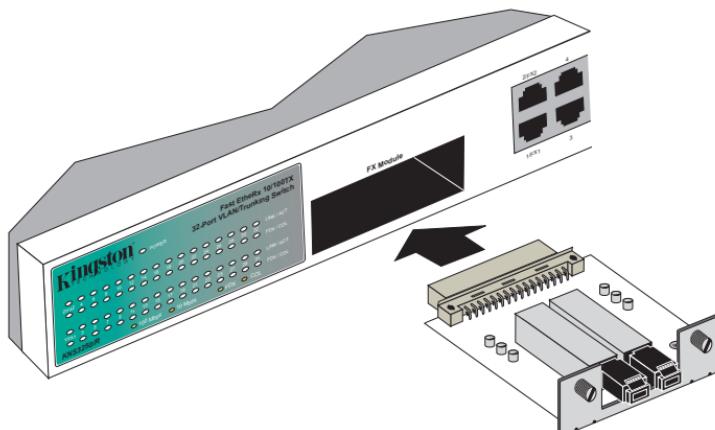
KNS150FX/ST



The KNS150FX/ST module

Installing the fiber module

1. Remove the screws holding the metal plate cover located over the Fiber FX Module Port and remove the metal plate cover.
2. Carefully slide the KNS150FX module into the Fiber FX Module Port as shown below.



3. Tighten both screws to secure the KNS150FX module within the Fast EtheRx Switch.

Appendix E Mounting Templates

The Fast EtheRx dual-speed hubs can be stationed on a flat surface using the four rubber feet provided, or mounted in a standard 19" rack by using the mounting brackets and thumb screws provided with the unit.

Rubber Feet for Desktops

The Fast EtheRx dual-speed hubs come with rubber feet that may be applied to the bottom of the unit for desktop surface installations. The 4 rubber feet have peel-off adhesive backing. Remove the backing and attach the feet to the bottom of the switch.

Brackets for Rack Mounting

The Fast EtheRx dual-speed hubs can also be mounted in a standard 19" rack using the brackets included with the unit. A rack mount installation uses a standard 19" dimension. Align the holes in the brackets with the holes on each side of the unit. Use the screws provided to secure the brackets to the Fast EtheRx dual-speed hub. See Figure E-1 below:

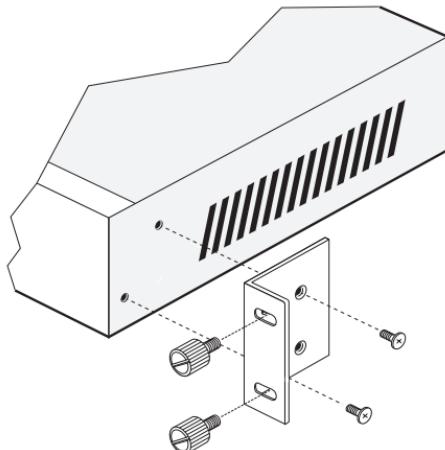


Fig. E-1 Attaching the Mounting Brackets

Important Note: Although the bracket has four holes, only 2 holes are used.

Appendix F Warranties and Notices

Limited Warranty Statement

KINGSTON TECHNOLOGY COMPANY (“Kingston”) warrants that this product is free from defects in material and workmanship. Subject to the conditions and limitations set forth below, Kingston will, at its option, either repair or replace any part of this product which proves defective by reason of improper workmanship or materials. Repair parts or replacement products will be provided by Kingston on an exchange basis, and will either be new or refurbished to be functionally equivalent to new.

This warranty does not cover any damage to this product that results from accident, abuse, misuse, natural or personal disaster, or any unauthorized disassembly, repair or modification.

Duration of Warranty

Lifetime Warranty: The following Kingston products are covered by this warranty for life: memory modules and expansion boards, networking adapters, networking hubs without cooling fans (excluding the power supply), and microprocessor upgrade products.

Seven Year Warranty: The following Kingston products are covered by this warranty for a period of seven years from the date of original retail purchase: all core storage enclosures (including the power supply), cables, terminators, and related accessories. Under certain agreements where core products are slightly modified (e.g. paint, handle, etc.) by Kingston at the customer’s request, the product will be covered for a period of seven years for repair only. Storage products that are custom designed and /or incorporate component-level modification by Kingston in order to meet specific customer requests, will be negotiated with the applicable customer on a per case basis.

Five Year Warranty: The following Kingston products are covered by this warranty for a period of five years from the date of original retail purchase: the power supply in networking hubs without cooling fans; Flash memory cards (e.g. CompactFlash, ATA Flash, and Linear Flash); solid state PC Card (PCMCIA) adapters, PC Card Readers and all other Kingston products (other than those products covered by a three-year, two-year, or one-year warranty, as provided below).

Three Year Warranty: The following Kingston products are covered by this warranty for a period of three years from the date of original retail purchase: networking hubs with cooling fans (including the power supply).

Two Year Warranty: The following Kingston products are covered by this warranty for a period of two years from the date of original retail purchase: Solid State Floppy Disk Cards (SSFDC), and Winchester hard disk drives in a 2.5 inch, 3.5 inch or 5.25 inch form factor.

One Year Warranty: The following Kingston products are covered by this warranty for a period of one year from the date of original retail purchase: Winchester hard disk drives in a 1.8 inch form factor, optical storage products, and magnetic tape storage products.

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Warranty Claim Requirements

To obtain warranty service, return the defective product, freight prepaid and insured, to your local authorized Kingston dealer or distributor, or to the Kingston factory service center located at 17600 Newhope Street, Fountain Valley, California 92708, U.S.A. You must include the product serial number (if applicable) and a detailed description of the problem you are experiencing. You must also include proof of the date of original retail purchase as evidence that the product is within the applicable warranty period. If you return the product directly to the Kingston factory, you must first obtain a Return Material Authorization ("RMA") number by calling Kingston Customer Service at (714) 438-1810, and include the RMA number prominently displayed on the outside of your package. Products must be properly packaged to prevent damage in transit.

Free Technical Support

Kingston provides free technical support. If you experience any difficulty during the installation or subsequent use of a Kingston product, please contact Kingston's Technical Support department prior to servicing your system.

Kingston Technical Support can be reached in the U.S. at (714) 435-2639 or toll-free at (800) 435-0640 (U.S. and Canada only). Kingston European Technical Support can be reached from within Europe at 00800 8888 0101 or by fax at 00800 8823 8823.

This warranty covers only repair or replacement of defective Kingston products, as provided above. Kingston is not liable for, and does not cover under warranty, any costs associated with servicing and/or the installation of Kingston products.

Disclaimers

The foregoing is the complete warranty for Kingston products and supersedes all other warranties and representations, whether oral or written. Except as expressly set forth above, no other warranties are made with respect to Kingston products and Kingston expressly disclaims all warranties not stated herein, including, to the extent permitted by applicable law, any implied warranty of merchantability or fitness for a particular purpose. In no event will Kingston be liable to the purchaser, or to any user of the Kingston product, for any damages, expenses, lost revenues, lost savings, lost profits, or any other incidental or consequential damages arising from the purchase, use or inability to use the Kingston product, even if Kingston has been advised of the possibility of such damages.

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F.C.C. Certification

This device has been tested and found to comply with limits for Class A digital device, pursuant to Part 15 of the FCC Rules. Operation is subject to the following two conditions:

- (1) This device may not cause harmful interference, and
- (2) This device must accept any interference received; including interference that may cause undesired operation.

CE Notice

The official CE symbol indicates compliance of this Kingston Technology product to the EMC directive of the European Community. The CE symbol indicates that this Kingston product meets or exceeds the following standards:

- EN50081-1** “Electromagnetic Compatibility-generic emissions standard”
EN55022: “Limits and methods of measurement of radio interference characteristics.”
- EN50082-1** “Electromagnetic Compatibility-generic immunity standard”
IEC 801-2: “Electrostatic discharge requirements”
IEC 801-3: “Radiated immunity requirements”
IEC 801-4: “Electrical fast transient requirements”
- EN60950** “Low Voltage Directive (LVD)”
- Declaration of CE Conformity** in accordance with the above standards has been made and is on file at Kingston Technology.



C-Tick Certification

- AS/NZS 3548** “Information Technology Equipment”
- Declaration of C-Tick Conformity** in accordance with the above standards has been made and is on file at Kingston Technology.

